

Dura Automotive Systems maintains acoustic performances of car windows thanks to Actran



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DURA Automotive Systems is a global automotive supplier specializing in the design, engineering, and manufacturing of solutions that drive the evolution of mobility.

With a legacy of over 100 years, the company is widely recognised by leading vehicle manufacturers as the preferred supplier partner for innovative, highly integrated, mechatronic systems, and lightweight solutions.

As vehicles transform to lightweight and electric architectures, their focus on disruptive technologies will enable superior performance and value creation.

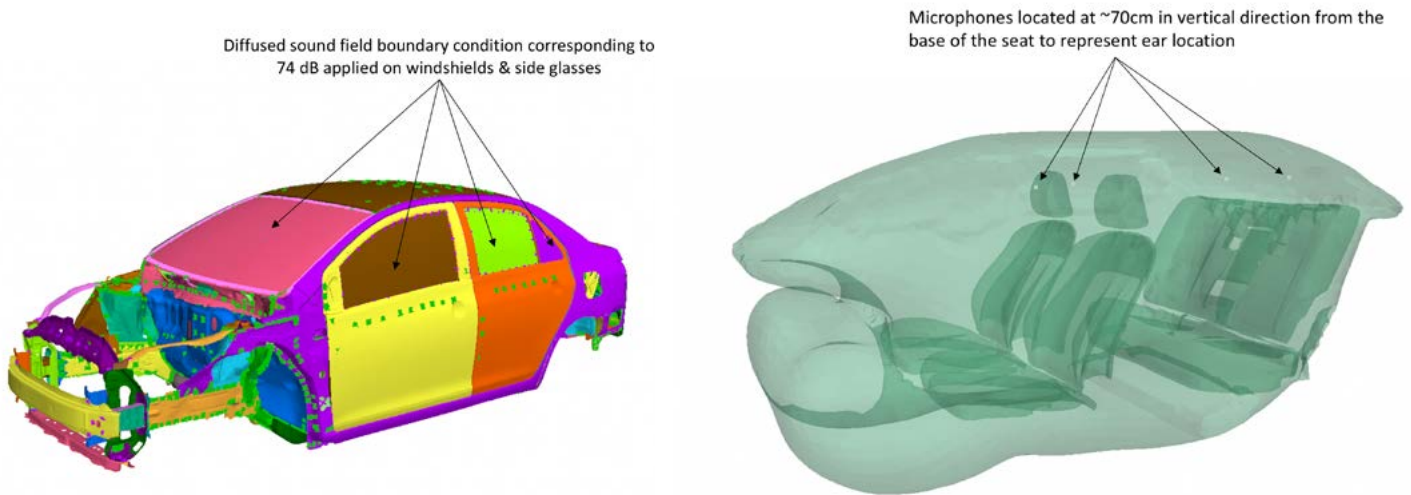


Figure 1- Car window acoustic analysis setup

Challenge

With Vehicle OEMs focusing on electrification, light-weighting is becoming a primary objective in vehicle design. While achieving the light-weighting, it is also essential to ensure that vehicle performance parameter such as Crash, NVH, Durability is not compromised and are within the set limits. Light weighting not only includes the metals but components like windshields and side glass as well.

For this automotive project, the company was looking at replacing the material for the side glass window of a vehicle with Acrylic. The objective was to reduce vehicle weight to improve performance. The current study focused on evaluating the effect of change in the material of side window glass on the noise propagation inside the passenger car cabin.

Solution

The Dura Team addressed the issue by carrying out Acoustics simulation using Actran. The team used an open-source Toyota Yaris Trimmed Body FE model to carry out the test. The final vibro-acoustic model consists in the windshield and side windows coupled to the interior cavity of the vehicle. Virtual microphones are placed at driver and passenger ears location and a diffused sound field corresponding to 74dB is applied on both the windshields and the side window glasses.

The noise levels of the driver and passenger ears were also measured. The team then changed the material of the side glass window to acrylic ones, and the noise values were measured again.

Microphones located at ~70cm in vertical direction from the base of the seat to represent ear location

Key highlights:

Product: Actran

Industry: Automotive

Benefits: Achieve the desired light-weighting of the vehicle while keeping noise levels constant

A comparison was made based on two sets of values. Additionally, the sound transmission loss of the glass side window with that of the acrylic side window was also made at a component level.

Benefits

The results of the simulation showed that the transmission loss for the acrylic side glass window was much lesser than that of glass material. There was no significant deterioration in the noise level at driver and passenger ears on the trimmed body level when the material for a quarter of the glass was replaced with Acrylic as the glass area was minimal.

With these material changes, Dura Team was able to achieve the desired light-weighting of the vehicle while keeping noise levels constant. "Actran simulation helped us evaluate the effect of material change on the NVH performance which gave further insights on making better decisions on light-weighting," observed a Dura Auto Engineer.



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